

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Currently Amended) A pressure vessel, comprising:  
an inner shell capable of serving as a gas barrier and a pressure resistant outer shell provided to cover the inner shell, which said outer shell is made of a carbon fiber reinforced plastic (CFRP) (~~FRP~~) comprising reinforcing fibers and a resin and of 35 GPa or more in tensile modulus and 1.5% or more in tensile breaking strain, wherein the outer shell comprises a layer of reinforcing fibers arranged, with reference to the axial direction of the pressure vessel, at an angle within a range from  $\pm 0^\circ$  to  $\pm 15^\circ$ , a layer of reinforcing fibers arranged at an angle within a range from  $\pm 75^\circ$  to  $\pm 105^\circ$  and a layer of reinforcing fibers arranged at an angle within a range from  $\pm 30^\circ$  to  $\pm 60^\circ$ , and in those layers, the volume ratio of reinforcing fibers is in the range of 1 : 1.5-2.5 : 0.2-1.2, respectively ~~reinforcing fibers comprise carbon fiber yarns of 0.30 or less in oxygen ratio at surface and 0.02 or more in nitrogen ratio at surface.~~
2. (Previously Presented) A pressure vessel of claim 1 wherein the inner shell is made of a metal, resin or FRP.
3. (Withdrawn) A pressure vessel of claim 1 wherein the inner shell has a gas barrier layer formed on the inside surface and/or outside surface.
4. (Withdrawn) A pressure vessel of claim 1 wherein the inner shell has a body portion, on which a reinforcing layer made of a FRP is formed.
5. (Previously Presented) A pressure vessel of claim 1 wherein the outer shell is 35 GPa or more in tensile modulus and 1.7% or more in tensile breaking strain.

6. (Previously Presented) A pressure vessel of claim 1 wherein the outer shell is 35 GPa or more in tensile modulus and 2.0% or more in tensile breaking strain.

7. (Previously Presented) A pressure vessel of claim 1 wherein the reinforcing fibers comprise carbon fiber yarns of 4.5 GPa or more in strand tensile strength and 2.0% or more in strand tensile breaking strain.

8. (Previously Presented) A pressure vessel of claim 1 wherein the reinforcing fibers comprise carbon fiber yarns of 5.5 GPa or more in strand tensile strength and 2.0% or more in strand tensile breaking strain.

9. – 23. (Canceled)

24. (Withdrawn) A pressure vessel of claim 1 wherein the pressure vessel has a body portion, and the outer shell has a layer structure of 5 or more layers around the body portion, the relation between the total thickness  $T$  (mm) of all the layers and the number  $N$  of the layers, satisfying  $0.5 \leq T/N \leq 6$ .

25. (Currently Amended and Withdrawn) A pressure vessel of claim 24 wherein, in said body portion, layers with reinforcing fibers hoop-wound and layers with reinforcing fibers helically wound ~~would~~ are alternately arranged in the thickness direction of the outer shell.

26. – 28. (Canceled)

29. (Withdrawn) A pressure vessel of claim 1 wherein the outer shell comprises the following components [X], [Y] and [Z], and the component [Z] is localized around the component [X] appearing in a cross sectional face of the outer shell:

[X] : a reinforced fiber bundle

[Y] : a thermosetting resin

[Z] : an elastomer and/or thermoplastic resin.

30. (Withdrawn) A pressure vessel of claim 29 wherein the ratio  $L_2/L_1$  satisfies  $1/100 \leq L_2/L_1 \leq 1/2$ , where  $L_1$  is the length of a straight line connecting the geometrical centers of two adjacent component [X],  $L_2$  is the length of a portion of the straight line crossing the component [Z] present between the said two adjacent component [X].

31. (Withdrawn) A pressure vessel of claim 29 wherein the component [Z] comprises at least one selected from the group consisting of polyvinyl acetate, polyamides, polycarbonates, polyacetals, polyphenylene oxide, polyphenylene sulfide, polyallylates, polyesters, polyamidimides, polyimides, polyether imides, polysulfones, polyether sulfones, polyether ether ketone, polyaramid, polybenzimidazole, polyethylene, polypropylene, cellulose acetate, cellulose butyrate, polyester based thermoplastic elastomers and polyamide based thermoplastic elastomers.

32. – 33. (Canceled)

34. (Previously Presented) A pressure vessel of claim 1 wherein the outer shell comprises a shoulder portion, and the innermost layer of the shoulder portion comprises a layer with reinforcing fibers hoop-wound.

35. (Previously Presented) A pressure vessel of claim 34 wherein the innermost layer is formed by the filament winding method.

36. (Withdrawn) A pressure vessel of claim 34 wherein the circumferential surfaces of the shoulder portion of the inner shell are formed to have steps in the axial direction, respectively extending in the circumferential direction.

37. – 39. (Canceled)

40. (Previously Presented) A pressure vessel of claim 1 wherein the inner shell comprises a neck portion, inside which a boss for nozzle installation is provided, and a seal ring is fitted on the end face of the neck portion around the boss for nozzle installation, and a pressing means is provided for pressing the seal ring toward the end face of the neck portion.

41. (Withdrawn) A pressure vessel of claim 40 wherein the pressing means comprises a seal ring pressing member and a clamp of the pressing member.

42. (Withdrawn) A pressure vessel of claim 40 wherein the pressing means comprises a pressing member threadedly engaged with the boss for nozzle installation.

43. (Withdrawn) A pressure vessel of claim 40 wherein the pressing means comprises a pressing member comprising a cylindrical portion threadedly engaged with the neck portion, and a collar portion held in contact with the seal ring.

44. (Withdrawn) A pressure vessel of claim 40 wherein the boss for nozzle installation comprises a flange portion, and the outer diameter of the pressing means is smaller than the outer diameter of the flange portion by 1 to 10 mm.

45. (Withdrawn) A pressure vessel of claim 40 wherein the end face of the neck portion comprises an annular groove provided to have the seal ring fitted therein.

46. (Withdrawn) A pressure vessel of claim 42 wherein the outer shell extends up to a position to cover the pressing member.

47. (Withdrawn) A pressure vessel of claim 43 wherein the cylindrical portion comprises a step.

48. (Withdrawn) A pressure vessel of claim 1 wherein the inner shell comprises a neck portion; a boss for nozzle installation is provided inside the neck portion; and the

surface of the boss for nozzle installation to be coupled with the neck portion has a rugged form.

49. (Withdrawn) A pressure vessel of claim 1 wherein the inner shell comprises a neck portion; inside which a boss for nozzle installation is provided, and the surface of the boss for nozzle installation to be coupled with the neck portion has a circumferentially extending ridge.

50. (Currently Amended and Withdrawn) A pressure vessel of claim 49 48 wherein additionally the surface to be coupled has a rugged form.

51. (Withdrawn) A pressure vessel of claim 48 wherein a seal ring is fitted on the end face of the neck portion around the boss for nozzle installation, and a means for pressing the seal ring toward the end face of the neck portion is provided.

52. (Withdrawn) A pressure vessel of claim 1 wherein the inner shell comprises a neck portion inside which a boss for nozzle installation is provided, and outside the neck portion a cylindrical member having a collar portion, a cylindrical portion in succession to the collar portion and a flange portion extending from the circumferential surface of the cylindrical portion into the outer shell are provided.

53. (Withdrawn) A pressure vessel of claim 52 wherein the flange portion extends annularly.

54. (Withdrawn) A pressure vessel of claim 52 wherein a seal ring is fitted on the end face of the neck portion around the boss for nozzle installation, and the collar portion presses the seal ring toward the end face of the neck portion.

55. (Withdrawn) A pressure vessel of claim 52 wherein a clamp of the cylindrical member, threadedly engaged with the boss for nozzle installation, is provided outside the collar portion of the cylindrical member.

56. (Withdrawn) A pressure vessel of claim 52 wherein the collar portion is threadedly engaged with the boss for nozzle installation.

57. (Withdrawn) A pressure vessel of claim 1 wherein the inner shell has a neck portion inside which a boss for nozzle installation having a flange portion and a body portion is provided and the outer diameter of the flange portion is larger than the outer diameter of the body portion by 20 mm to 25 mm, and the cylindrical portion has a tapered surface kept in contact with the neck portion.

58. (New) A pressure vessel, comprising:  
an inner shell capable of serving as a gas barrier and a pressure resistant outer shell provided to cover the inner shell, which said outer shell is made of a carbon fiber reinforced plastic (CFRP) comprising reinforcing fibers and a resin and of 35 GPa or more in tensile modulus and 1.5% or more in tensile breaking strain, wherein the outer shell comprises a layer of reinforcing fibers arranged, with reference to the axial direction of the pressure vessel, at an angle within a range from  $\pm 5^\circ$  to  $\pm 50^\circ$  and a layer of reinforcing fibers arranged at an angle within a range from  $\pm 75^\circ$  to  $\pm 105^\circ$  and the volume ratio of reinforcing fibers in those layers is in the range of 1.0 : 1.0-2.0, respectively.

59. (New) A pressure vessel of claim 58 wherein the inner shell is made of a metal, resin or FRP.

60. (New) A pressure vessel of claim 58 wherein the inner shell has a gas barrier layer formed on the inside surface and/or outside surface.

61. (New) A pressure vessel of claim 58 wherein the inner shell has a body portion, on which a reinforcing layer made of a FRP is formed.

62. (New) A pressure vessel of claim 58 wherein the outer shell is 35 GPa or more in tensile modulus and 1.7% or more in tensile breaking strain.

63. (New) A pressure vessel of claim 58 wherein the outer shell is 35 GPa or more in tensile modulus and 2.0% or more in tensile breaking strain.

64. (New) A pressure vessel of claim 58 wherein the reinforcing fibers comprise carbon fiber yarns of 4.5 GPa or more in strand tensile strength and 2.0% or more in strand tensile breaking strain.

65. (New) A pressure vessel of claim 58 wherein the reinforcing fibers comprise carbon fiber yarns of 5.5 GPa or more in strand tensile strength and 2.0% or more in strand tensile breaking strain.

66. (New) A pressure vessel of claim 58 wherein the pressure vessel has a body portion, and the outer shell has a layer structure of 5 or more layers around the body portion, the relation between the total thickness  $T$  (mm) of all the layers and the number  $N$  of the layers, satisfying  $0.5 \leq T/N \leq 6$ .

67. (New) A pressure vessel of claim 66 wherein, in said body portion, layers with reinforcing fibers hoop-wound and layers with reinforcing fibers helically wound are alternately arranged in the thickness direction of the outer shell.

68. (New) A pressure vessel of claim 58 wherein the outer shell comprises the following components [X], [Y] and [Z], and the component [Z] is localized around the component [X] appearing in a cross sectional face of the outer shell:

[X] : a reinforced fiber bundle

[Y] : a thermosetting resin

[Z] : an elastomer and/or thermoplastic resin.

69. (New) A pressure vessel of claim 68 wherein the ratio  $L_2/L_1$  satisfies  $1/100 \leq L_2/L_1 \leq 1/2$ , where  $L_1$  is the length of a straight line connecting the geometrical centers of two

adjacent component [X],  $L_2$  is the length of a portion of the straight line crossing the component [Z] present between the said two adjacent component [X].

70. (New) A pressure vessel of claim 68 wherein the component [Z] comprises at least one selected from the group consisting of polyvinyl acetate, polyamides, polycarbonates, polyacetals, polyphenylene oxide, polyphenylene sulfide, polyallylates, polyesters, polyamidimides, polyimides, polyether imides, polysulfones, polyether sulfones, polyether ether ketone, polyaramid, polybenzimidazole, polyethylene, polypropoylene, cellulose acetate, cellulose butyrate, polyester based thermoplastic elastomers and polyamide based thermoplastic elastomers.

71. (New) A pressure vessel of claim 58 wherein the outer shell comprises a shoulder portion, and the innermost layer of the shoulder portion comprises a layer with reinforcing fibers hoop-wound.

72. (New) A pressure vessel of claim 71 wherein the innermost layer is formed by the filament winding method.

73. (New) A pressure vessel of claim 71 wherein the circumferential surfaces of the shoulder portion of the inner shell are formed to have steps in the axial direction, respectively extending in the circumferential direction.

74. (New) A pressure vessel of claim 58 wherein the inner shell comprises a neck portion, inside which a boss for nozzle installation is provided, and a seal ring is fitted on the end face of the neck portion around the boss for nozzle installation, and a pressing means is provided for pressing the seal ring toward the end face of the neck portion.

75. (New) A pressure vessel of claim 74 wherein the pressing means comprises a seal ring pressing member and a clamp of the pressing member.

76. (New) A pressure vessel of claim 74 wherein the pressing means comprises a pressing member threadedly engaged with the boss for nozzle installation.

77. (New) A pressure vessel of claim 74 wherein the pressing means comprises a pressing member comprising a cylindrical portion threadedly engaged with the neck portion, and a collar portion held in contact with the seal ring.

78. (New) A pressure vessel of claim 74 wherein the boss for nozzle installation comprises a flange portion, and the outer diameter of the pressing means is smaller than the outer diameter of the flange portion by 1 to 10 mm.

79. (New) A pressure vessel of claim 74 wherein the end face of the neck portion comprises an annular groove provided to have the seal ring fitted therein.

80. (New) A pressure vessel of claim 76 wherein the outer shell extends up to a position to cover the pressing member.

81. (New) A pressure vessel of claim 77 wherein the cylindrical portion comprises a step.

82. (New) A pressure vessel of claim 58 wherein the inner shell comprises a neck portion; a boss for nozzle installation is provided inside the neck portion; and the surface of the boss for nozzle installation to be coupled with the neck portion has a rugged form.

83. (New) A pressure vessel of claim 58 wherein the inner shell comprises a neck portion; inside which a boss for nozzle installation is provided, and the surface of the boss for nozzle installation to be coupled with the neck portion has a circumferentially extending ridge.

84. (New) A pressure vessel of claim 83 wherein additionally the surface to be coupled has a rugged form.

85. (New) A pressure vessel of claim 82 wherein a seal ring is fitted on the end face of the neck portion around the boss for nozzle installation, and a means for pressing the seal ring toward the end face of the neck portion is provided.

86. (New) A pressure vessel of claim 58 wherein the inner shell comprises a neck portion inside which a boss for nozzle installation is provided, and outside the neck portion a cylindrical member having a collar portion, a cylindrical portion in succession to the collar portion and a flange portion extending from the circumferential surface of the cylindrical portion into the outer shell are provided.

87. (New) A pressure vessel of claim 86 wherein the flange portion extends annularly.

88. (New) A pressure vessel of claim 86 wherein a seal ring is fitted on the end face of the neck portion around the boss for nozzle installation, and the collar portion presses the seal ring toward the end face of the neck portion.

89. (New) A pressure vessel of claim 86 wherein a clamp of the cylindrical member, threadedly engaged with the boss for nozzle installation, is provided outside the collar portion of the cylindrical member.

90. (New) A pressure vessel of claim 86 wherein the collar portion is threadedly engaged with the boss for nozzle installation.

91. (New) A pressure vessel of claim 58 wherein the inner shell has a neck portion inside which a boss for nozzle installation having a flange portion and a body portion is provided and the outer diameter of the flange portion is larger than the outer diameter of the body portion by 20 mm to 25 mm, and the cylindrical portion has a tapered surface kept in contact with the neck portion.